EAT•N

Power Xpert® Architecture

Capabilities Brochure

PowerChain Management™?

Your enterprise depends on a power system

Inside every enterprise, there's a power system—the equipment and software that transform electricity into useful results. Whether your organization is large or small, it depends on its power system to provide high quality, safe, reliable power every minute of every day. Without power, the cash register is silent, the data center is dark, and the production line doesn't move.

If your company is like most, its power system was built over time. As the organization's needs changed, a circuit breaker was added here and a transformer was replaced there. The result? Often, it's a power system that's a complicated mixture of old and new equipment from several manufacturers. Because there's no common way of communicating across equipment, gathering data across the system isn't easy.

Seeing the big picture can be difficult

All of this complexity means it's difficult to get a clear picture of what's happening inside your power system. When you can't see what's happening, you can't manage your power system effectively. And that's when business results suffer, because your enterprise depends on its power system.

Eaton®'s PowerChain Management solutions can help you transform that complicated power system into an integrated system you can see and measure and manage as a strategic business asset. And that can give you a real competitive advantage.

Every enterprise has a power system—utilities, data centers, universities, manufacturing plants. And Eaton's PowerChain Management solutions can help each of them manage that power system for peak performance.
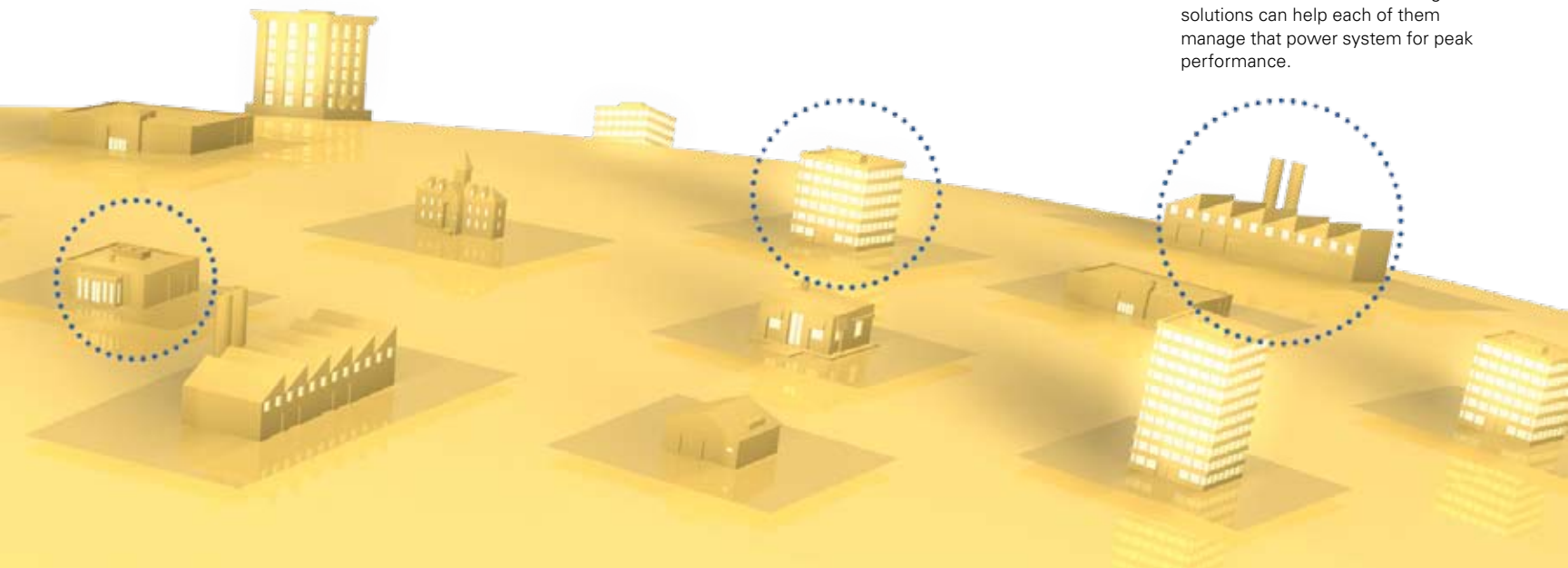
Get the most
out of your power system

Managing your power system

Does your organization manage its power system as a strategic asset? If it doesn't, you're not getting the most out of your power system—and your business performance is suffering. Perhaps you're paying too much for energy, because energy loads aren't managed efficiently. Or you're replacing production equipment prematurely, because it's been damaged by poor quality power. Or a scientist's test results are lost when the power in the lab fails at a critical moment.

Optimizing your power system

Eaton looks at your power system as a strategic asset—an approach we call PowerChain Management solutions. We help you manage your power system for peak performance by integrating and optimizing the elements of your power system and ensuring that they align with your business goals.

Eaton's Power Xpert® Architecture is the backbone of Eaton's PowerChain Management. Power Xpert Architecture can transform your power system into an integrated, agile system that you can monitor, control and manage effectively and efficiently.

Eaton PowerChain Management solutions help you manage your power system as a strategic asset that gives you real business benefits.

Greater reliability
Maintain vital operations with steady, high-quality power every minute of every day.

Effective use of capital
Put your capital to work faster, and keep it working longer, with electrical designs that require less equipment and space, services that extend equipment life and preassembled equipment that can be installed faster.

Risk mitigation
Reduce the risk of construction delays and cost overruns with a coordinated approach to power system design, procurement, installation and maintenance.

Cost efficiencies
Reduce operating costs with effective energy management and maintenance strategies.

Enhanced safety
Reduce electrical hazards with safety-conscious design and installation, plus products and information that help people recognize and avoid danger.

See the big picture…
and the details

To manage your power system most effectively, you need to see the big picture. But that big picture of what's happening must be based on detailed data from each piece of gear in your power system.
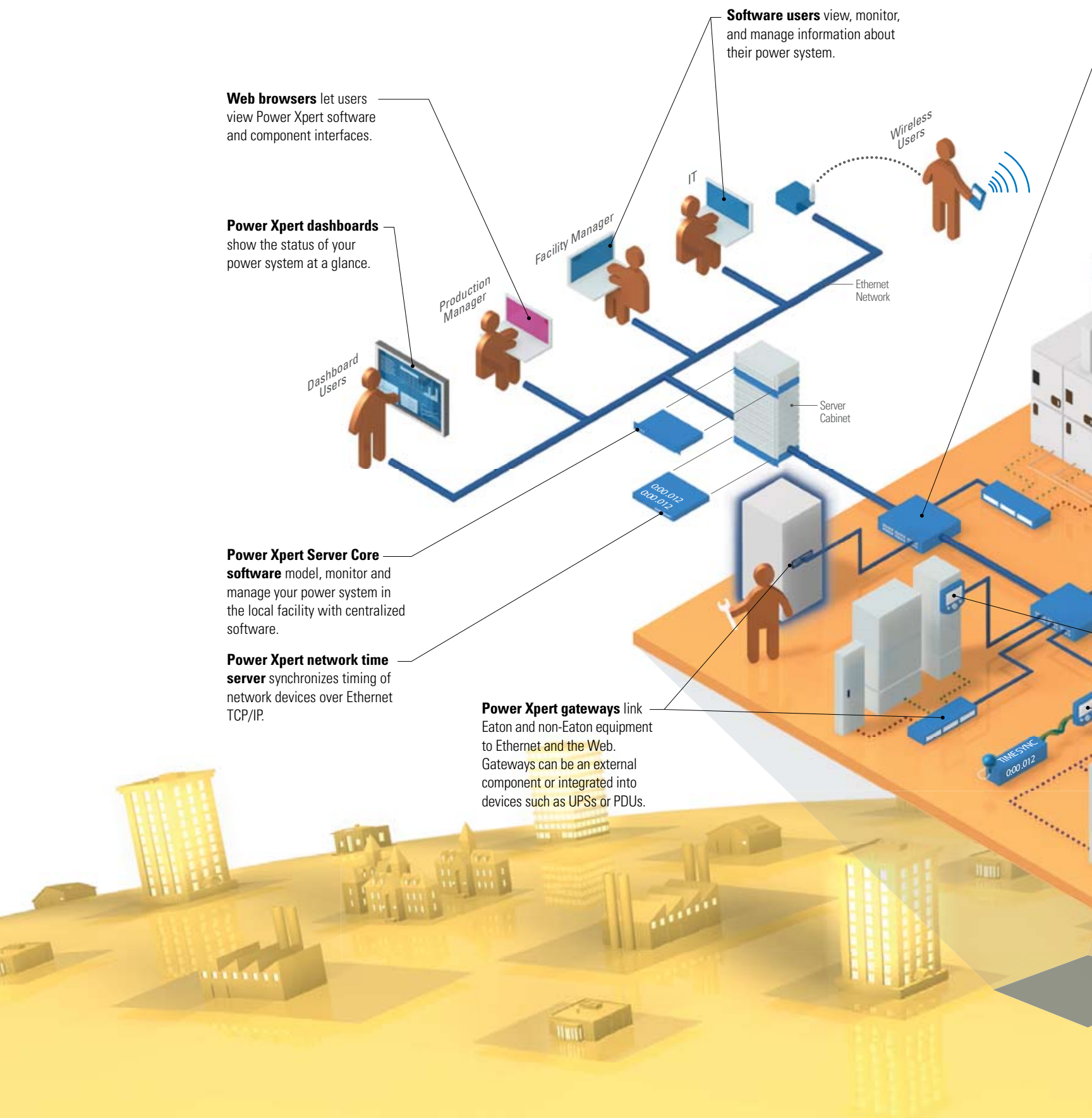
Bringing your power system together

Gathering data can be difficult. Some of your power distribution equipment may not be able to communicate data at all. Other equ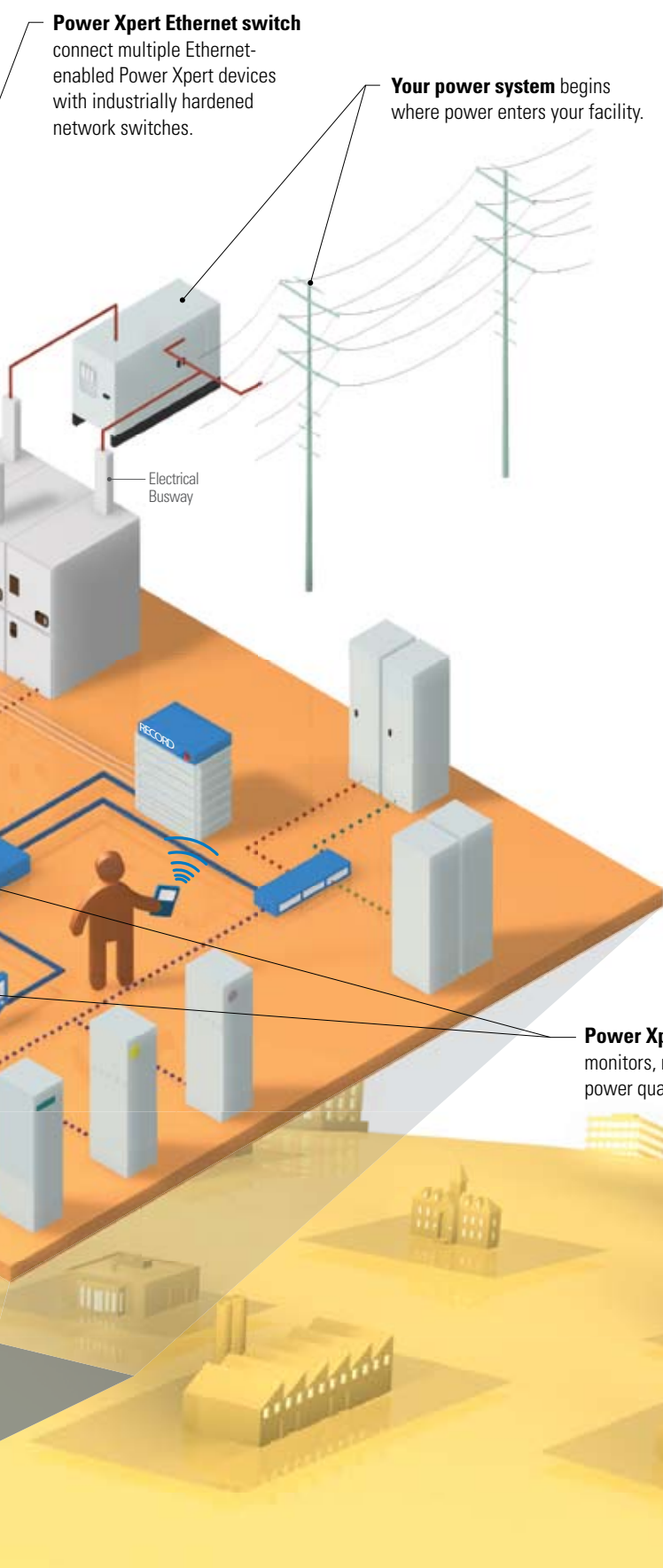ipment may use proprietary communication methods that make it difficult to consolidate data across brands of equipment. And even when equipment can communicate, you face problems consolidating data from devices whose time-keeping isn't tightly synchronized.

Once data is gathered, you need a framework to help you integrate and analyze the data. You need management tools to choose the right course of action. You need to analyze events, decide what to do, and then take action. You need Power Xpert Architecture.

Power Xpert Architecture:
Transform your power system

Software users view, monitor, and manage information about their power system.

Web browsers let users view Power Xpert software and component interfaces.

Wireless Users

IT

Power Xpert dashboards show the status of your power system at a glance.

Facility Manager

Production Manager

Ethernet Network

Dashboard Users

Server Cabinet

000.012
000.012

Power Xpert Server Core software model, monitor and manage your power system in the local facility with centralized software.

Power Xpert network time server synchronizes timing of network devices over Ethernet TCP/IP.

Power Xpert gateways link Eaton and non-Eaton equipment to Ethernet and the Web. Gateways can be an external component or integrated into devices such as UPSs or PDUs.

TIMESYNC
000.012

Eaton's PowerChain Management solutions help you integrate components of your power system for optimal performance. That's why Eaton has designed Power Xpert Architecture to measure, monitor, connect and manage your power system, via a simple, Web-based interface. Power Xpert Architecture transforms your power system from an unmanaged liability into a strategic asset.
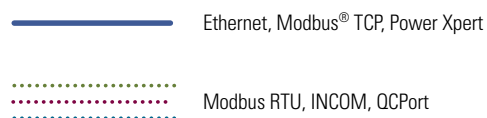
Power Xpert software

Power Xpert Server Core software helps you monitor, manage and model the critical components in your power system. A customizable software interface gives you key information at a glance, with centralized measurement and alarm information.

Power Xpert Server Core software also offers add-on modules you can match to your specific needs. Add-on modules provide capabilities ranging from energy consumption analysis and cost allocation to virtual system layout and modeling.

Power Xpert components

Power Xpert hardware components, such as gateways and meters, give you the ability to gather data from each piece of equipment in your power system. With Power Xpert Architecture, each component in your power system is connected to a computer network using an Ethernet communication protocol. Once connected, you can measure and monitor your equipment, regardless of its age or manufacturer.

Power Xpert components help synchronize the clocks on your equipment to give you accurate, usable data for the entire power system. When an event like a lightning strike happens, you can track the effects in your power system with pinpoint accuracy.

Power Xpert Ethernet switch connect multiple Ethernet-enabled Power Xpert devices with industrially hardened network switches.

Your power system begins where power enters your facility.

Electrical Busway

RECORD

Ethernet, Modbus® TCP, Power Xpert

Modbus RTU, INCOM, QCPort

Power Xpert meter measures, monitors, records, and analyzes power quality.

Power Xpert Architecture puts you in control

Power Xpert Architecture lets you integrate your power system on your own terms. Power Xpert Architecture takes an open standards approach to equipment and software. No matter which brand of equipment you have installed, Power Xpert Architecture can help you connect it to the monitoring and management software you choose. You're not locked into a narrow choice of equipment or software. And if you're already using Eaton equipment, Power Xpert Architecture can help you get more from it.

Opening the door to better communication

Power Xpert Architecture helps you go beyond traditional power management systems. Power Xpert Architecture can open the door to communicating with the rest of your organization, because it is based on the Ethernet protocol that is the de facto standard for modern local area communications networks. Once your power system is linked to an Ethernet network via the Power Xpert Architecture, you can connect to applications like the building management system monitoring your HVAC equipment, or share information with your enterprise accounting system.
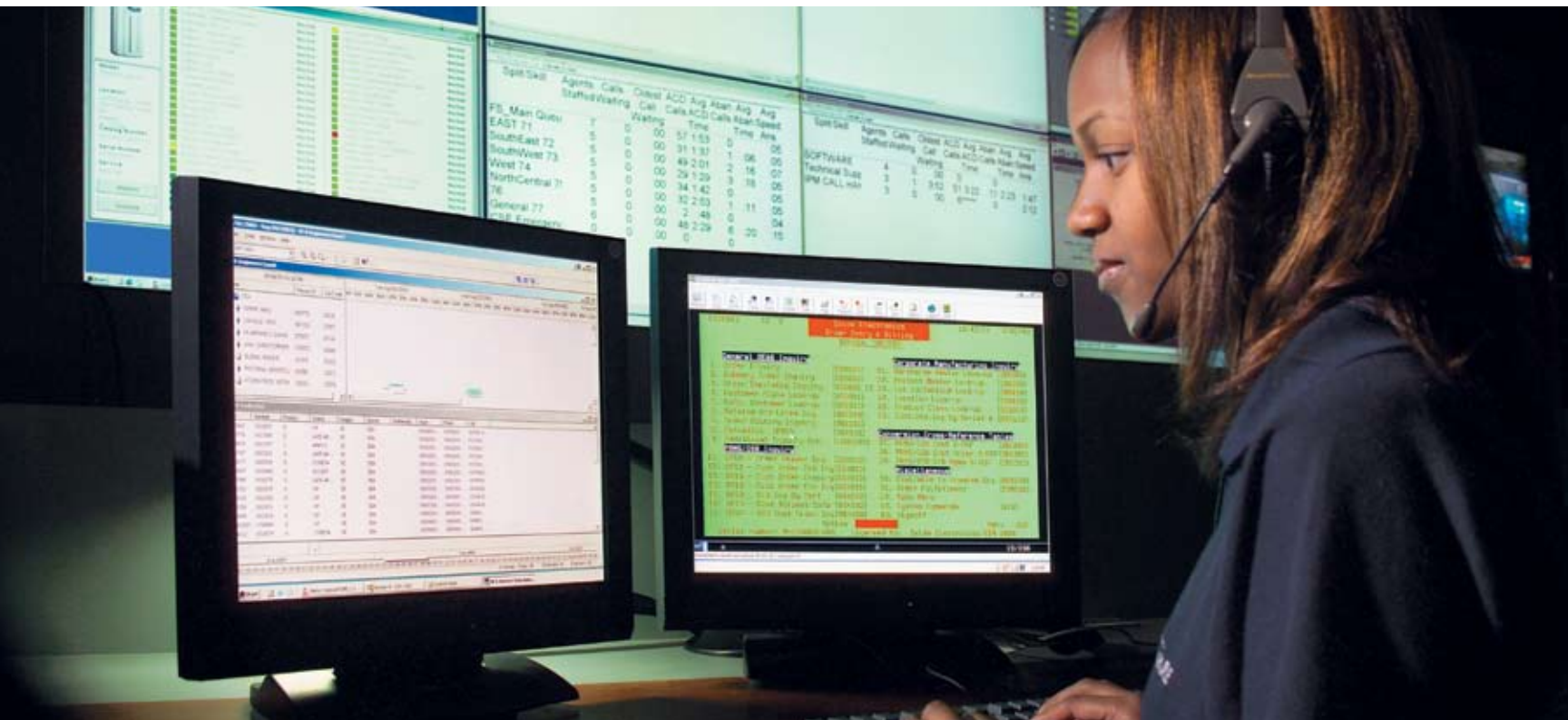
Every millisecond counts

In the critical power environment, milliseconds count. Power quality events may last for just fractions of a second, but they can have a catastrophic effect on the quality and reliability of your power distribution system. And, to see the big picture, you may need to correctly analyze a sequence of events throughout your whole system.

Tracking the effects of an event through your power system requires accurate timing synchronization. If each piece of equipment isn't synchronized with all of the others, you can't see the big picture.

Power Xpert Architecture provides network-based timing accuracy to enable the precise synchronization you need to effectively manage your power system.

Accuracy
By taking readings at sub-cycle levels—like the Power Xpert 8000 model, which can sample at a rate of 166.67 nanoseconds per sample—Power Xpert Meters let you accurately see the detailed performance of each piece of gear they are connected to.
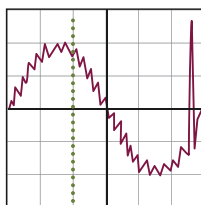
Time
To understand the cause and effect of events, you need to be able to analyze the interaction of equipment and the sequence of events. This requires accurate time synchronization across the system.
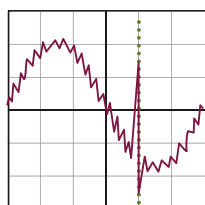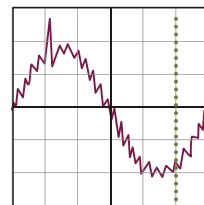
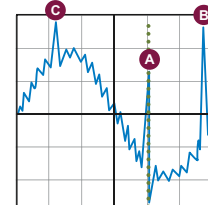**Switchgear A**
An event occurs *at* time T1

Switchgear B
An event occurs *just after* time T1

Switchgear C
An event occurs just *before* time T1

Time Synchronized View
Since Power Xpert Architecture allows switchgear A, B, and C to be synchronized with millisecond accuracy, the sequence of events can be understood and analyzed.

Power Xpert Architecture
gives you the flexibility you want

Eaton's Power Xpert Architecture offers the flexibility you want. Power Xpert Architecture can deliver a PowerChain Management solution for you, whatever the size and complexity of your power system.

You decide how much of your power system you want to integrate, and how. Start small by monitoring one or two pieces of equipment through a basic Web interface. Or build

customized software interfaces that let you manage all of a complex power system like a data center.

And wherever you begin, you can easily extend Power Xpert Architecture to other parts of your power system later. Power Xpert Architecture's scalable, customizable solutions keep your options open.
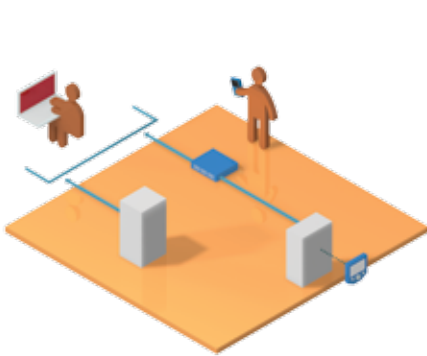

Basic solution

Web-enabled Power Xpert meters or Web-enabled UPSs with optional Ethernet cards

For smaller applications, simple Web-enabled devices provide a convenient way to monitor a few devices.

- Devices such as meters and UPSs communicate with the Ethernet network via optional communications expansion card

- Meters can be installed separately or purchased already installed on Eaton equipment

- Built-in Web server supports monitoring of metered information and alarm points via Web browser

- Receive e-mail notice of alarms; access alarm history via Web

- Cost-efficient way to monitor individual components
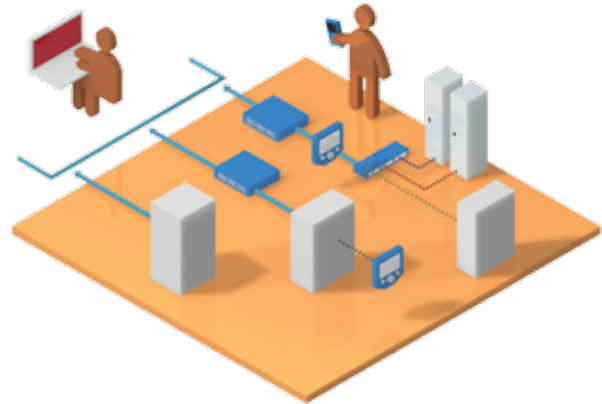
Expanded solution

Power Xpert gateways, plus both Eaton and non-Eaton equipment

For larger groups of equipment, connect and monitor INCOM, QCPort, or Modbus RTU devices.

- Built-in Web server in gateway

- Real-time monitoring of all connected equipment via Web browser

- E-mail notice of individual device alarms; access to alarm history on some models
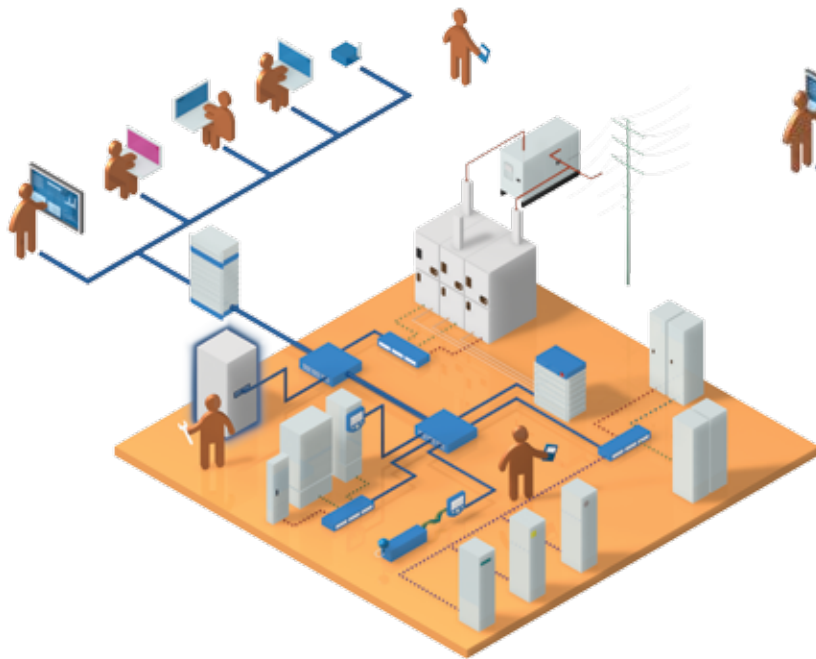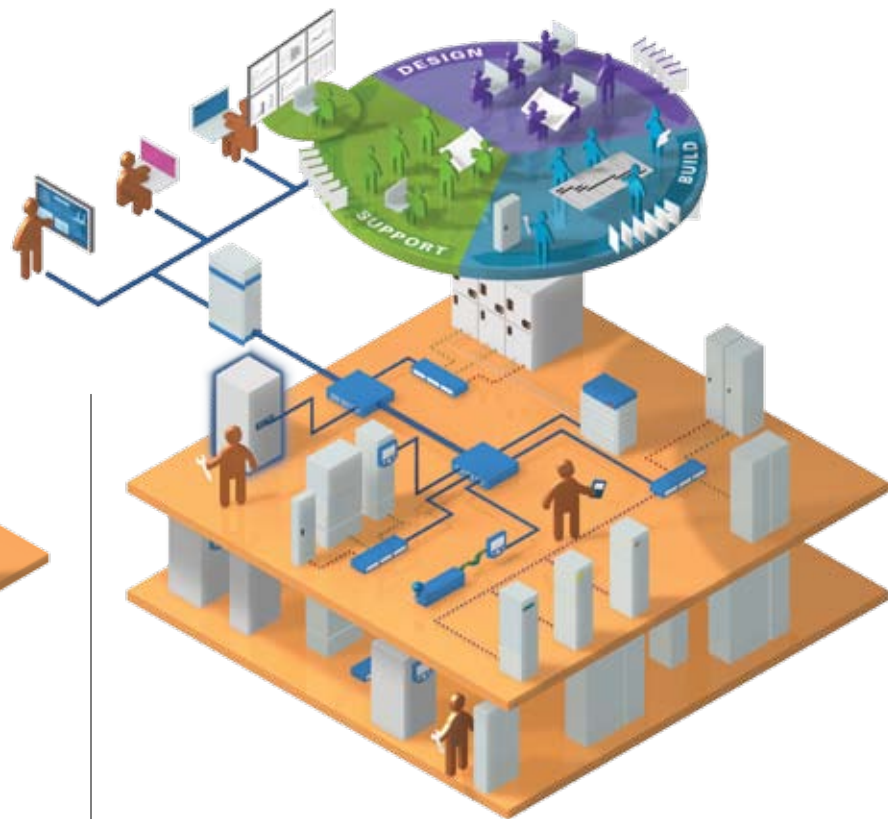
Advanced solution

Power Xpert software, plus Power Xpert components and Ethernet-enabled equipment

Connect, monitor, and manage your facilities, including Eaton and non-Eaton equipment, through a single, customizable, Web-enabled software interface.

- Centralized alarm notification, reporting and escalation
- Connect components through network switches or gateways
- Time synchronization throughout with compatible devices, when the Network Time Server is used
- Full suite of software tools to monitor system health
- Add-on modules available for modeling, energy consumption analysis, graphics customization, and cost allocation detail

Customized solution

Power Xpert software, plus Power Xpert components and Ethernet-enabled equipment, plus integration services provided by Eaton Electrical Services & Systems

Connect, monitor and manage a group of Eaton and other manufacturers' equipment through a software interface customized by Eaton.

- Customized Web screen displays
- Centralized alarm notification, reporting and escalation
- Customized translation of data from multiple communication protocols
- Full suite of software tools to monitor system health; all add-on modules available

Explore your options with Power Xpert software and components

Power Xpert Architecture, a PowerChain Management solution, offers the software and components you need to transform your power system. Here are the current and planned product offerings.

Components for measuring, monitoring, recording and analysis

Meters

Measure, monitor, record and analyze power quality

Meters measure and monitor critical information about your power system in real time. Monitor at the local display or via a standard Web browser.

- Optional built-in Web server
- Intuitive, easy-to-use information displays
- Real-time information for current loading, voltage and power levels and more
- Energy and demand readings to help manage the cost of energy
- Easy-to-use format for easier decision making
- Automatic alarms about system events
- Power Quality Index

Components for connecting

Gateways

Link components and equipment to Ethernet networks and the Web

Gateways connect a wide variety of both Eaton and non-Eaton equipment to Ethernet networks and the Web.

- Built-in Web server
- Compatible with Eaton equipment using INCOM, QCPort or XCP protocols
- Compatible with both Eaton and non-Eaton equipment using Modbus RTU
- Intuitive, well-organized information displays of system and device data
- Can communicate data to standard Web browsers, Power Xpert software, or non-Eaton monitoring packages via Modbus TCP and SNMP
- Available in two form factors: an industrialized module for power distribution connectivity, and a plug-in XSlot™ card for Powerware UPS and PDU connectivity

Ethernet Switches

Connect multiple Ethernet-enabled devices

Switches provide a central connection point for a group of Ethernet-enabled Power Xpert devices.

- Industrially hardened
- High mean-time-between-failure (MTBF)
- Several unmanaged versions available

Power Xpert software

Server Core

Monitor and manage your power system from a local server

Power Xpert Server Core software lets you monitor and manage the critical components in your power system. And it serves as the foundation for a suite of add-on modules that you can match to your specific needs.

- Monitor detailed, centralized information for your power system in real time
- Integrated graphics capability
- Set alarms for critical attributes like voltage or frequency variances
- Filter and sort alarms by priority
- See trends for historical data
- Provides computer O/S shutdown for UPS-protected systems

Optional add-on software modules

Quality Manager

Analyze power quality

Quality Manager lets you see the critical quality attributes for your power system—voltage, power, current, transients, harmonics, waveforms and time—via a waveform viewer.

- Spot trends faster with easy-to-read graphical displays of captured information
- Monitor for voltage disturbances, voltage variances and more
- Analyze complex waveforms
- See trends for historical data

Layout Manager

Lay out and model power systems

Layout Manager lets you model actual physical representations in a virtual replica of your real-world power system.

- Build complete power system diagrams
- Wide range of symbols and icons
- Create building groups that mirror your physical facilities or organization structure
- Create drill-down Web pages to display your data the way you want to see it

Energy Manager

Analyze power usage and manage cost allocation

Energy Manager helps you capture and manage the factors that drive your energy costs.

- Monitor energy use by time and location
- See energy use patterns
- Improve energy purchasing decisions with better information and analysis
- Verify energy bills
- Allocate costs more precisely to tenants, departments, or projects

Components for recording and synchronizing

Network Time Servers

Synchronize timing of devices on an Ethernet network

Time servers allow multiple devices to be synchronized to the same time, enabling more advanced analysis.

- Sub-second to sub-millisecond accuracy
- Easily configured through DHCP or the serial port
- Available in GPS or CDMA versions

Components for viewing data

Dashboards*

Provide customized, at-a-glance views of your power system

Dashboards give you a customized, easy-to-read screen display of key information about your power system.

- Wall-mounted screen display
- Continuous display of system information
- Configurable displays

* Denotes product in development and not yet available.

Modbus TCP/IP Connector

Connects to and retrieves data from devices using Modbus TCP/IP protocol

Modbus TCP/IP Connector provides interfaces to devices from many non-Eaton manufacturers that communicate via Modbus TCP/IP.

- Industry-standard Modbus TCP/IP
- Flexible import tool to automate imports of register maps

SNMP Connector

Connects to and retrieves data from devices using SNMP protocol

SNMP Connector provides interfaces to non-Eaton devices that communicate via SNMP protocol.

- Industry-standard SNMP support
- Flexible compiler to process MIB files

Device Connector

Connect to non-Eaton communicating equipment through proprietary communications interfaces

Device Connector links equipment to non-Eaton communicating equipment through proprietary interfaces.

Contact your local EESS office to order.

Transform your power system from a liability to an asset

Ready to learn more about how Power Xpert Architecture, software, and components can help you see the big picture of your power system? Contact us for more information.

**For more information, visit
www.eaton.com/PowerXpert**
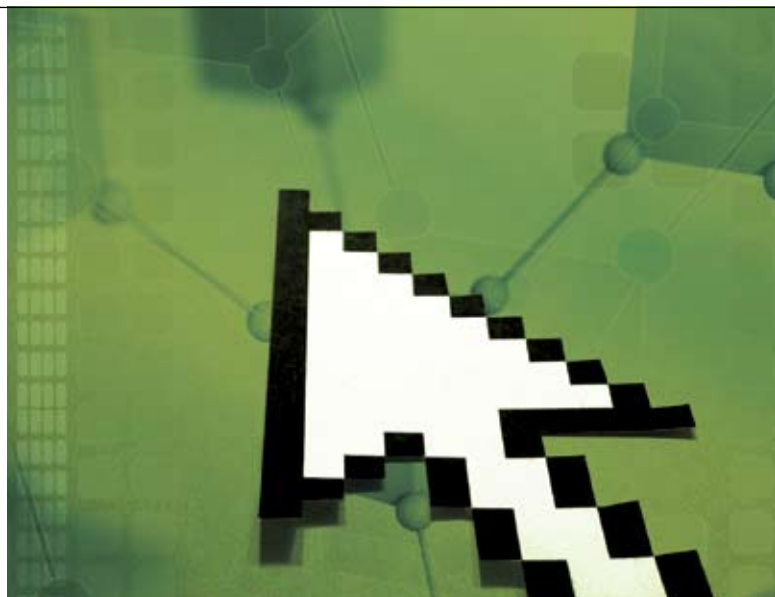
**Call for more information.
1.800.525.2000**

Eaton®'s electrical business is a global leader in electrical control, power distribution, uninterruptible power supply and industrial automation products and services. Eaton's global electrical brands, including Powerware® and Cutler-Hammer®, provide customer-driven PowerChain Management™ solutions to serve the power system needs of the industrial, institutional, government, utility, commercial, residential, IT, mission critical and OEM markets worldwide. For more information, visit www.EatonElectrical.com.

Eaton Corporation is a diversified industrial manufacturer with 2005 sales of $11.1 billion. Eaton is a global leader in electrical systems and components for power quality, distribution and control; fluid power systems and services for industrial, mobile and aircraft equipment; intelligent truck drivetrain systems for safety and fuel economy; and automotive engine air management systems, powertrain solutions and specialty controls for performance, fuel economy and safety. Eaton has 60,000 employees and sells products to customers in more than 125 countries. For more information, visit www.eaton.com.

PowerChain
Management®
Solutions

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